

Case Report

Atrial fibrillation associated with high voltage electric shock in a young healthy female: a case report

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Received: 04 February 2015

Revised: 15 February 2015

Accepted: 03 March 2015

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ABSTRACT

Atrial fibrillation is amongst the various arrhythmias resulting after electrical injury but its incidence has been reported to be extremely rare. Here we are reporting a case of 35 years old lady presenting to our Emergency department with atrial fibrillation with fast ventricular rate after accidentally being injured by high voltage electrical current. She was managed successfully with pharmacological cardioversion followed by a period of observation. The rhythm reverted back to normal sinus rhythm on 3rd day. This approach of management is amongst one of the few published cases where patient was managed conservatively.

Keywords: Atrial fibrillation, Electric shock/current/accident/injury, High voltage

INTRODUCTION

A 35 years old lady presented to our emergency department with atrial fibrillation with fast ventricular rate after accidental high voltage electrical injury. She was successfully managed conservatively with infusion of amiodarone (150 mg IV bolus) followed by observational period; when she reverted to normal sinus rhythm on 3rd day. Other parameters as physical examination, cardiac markers, chest X-ray and echocardiography showed no significant findings.

CASE REPORT

A 35 years old lady presented to our emergency department at night of December with complaints of palpitation and burning on both aspects of right hand. The history revealed that high tension wire (>11 KV) fell accidentally on the wire circuit supplying her village and she got injured when she accidentally came in contact with wire in her house. At presentation, she was conscious, communicating and oriented. On physical

examination, her pulse was 140/minute, irregularly irregular and BP was 120/80 mmHg. Cardiovascular and respiratory examination showed no significant findings. Right hand had burn marks on both surfaces and both soles were also had burn marks (Figure 1). Past history was not suggestive of any cardiac problems or any other significant medical problems. No previous episodes of palpitation or loss of consciousness were present. ECG taken at admission showed narrow complex tachycardia with irregularly irregular rhythm (Figure 2).

She was conservatively treated for the burn immediately. For Atrial Fibrillation (AF) with fast ventricular rate, infusion amiodarone was started with 150 mg IV bolus over a period of 10 minutes. Echocardiography was done that showed no structural/valvular heart disease, no presence of clot or any vegetation and had normal left ventricular function. After IV bolus of amiodarone, ECG showed AF with controlled ventricular rate (Figure 3). Heart rate slowed down to 90/minute. During the infusion, she developed episodes of vomiting and blood pressure dropped to 80 mmHg systolic. So infusion was

withheld for a brief period and was restarted when blood pressure came to 100 mmHg systolic. In view of symptoms and hypotension during the infusion, it was planned to keep her further under observation and cardiac monitoring. During cardiac monitoring, she had no further arrhythmia and on day 3, she got reverted back to sinus rhythm with normal heart rate (76/minute) (Figure 4). The vitals were in normal range during the observation period. Thereafter she was discharged and referred to Surgery department for further management of burn and also advised for follow-up in the Medicine OPD.



Figure 1: Burn mark on right hand due to electrical injury.

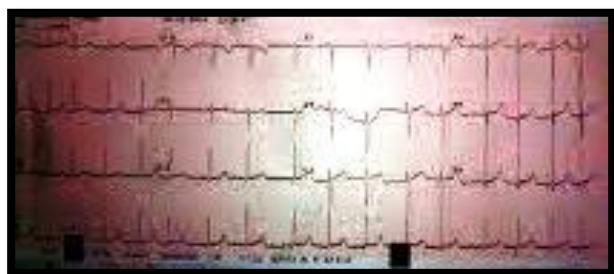


Figure 2: Electrocardiogram at admission showed atrial fibrillation with fast ventricular rate.



Figure 3: Electrocardiogram after amiodarone infusion showed atrial fibrillation with controlled ventricular rate.

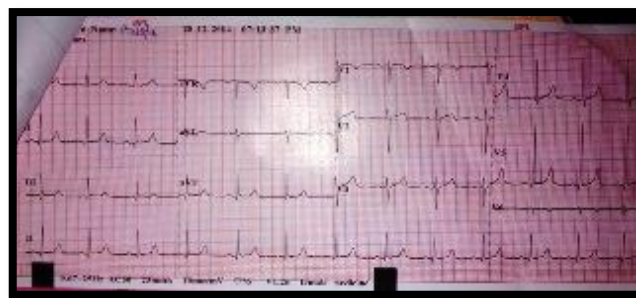


Figure 4: After 3 days of observation showed sinus rhythm with normal heart rate.

Cardiac enzyme markers were done. Troponin T was negative and CKMB was in normal range. All relevant biochemical investigations were also in normal range. Chest X-ray was within normal limit.

Atrial Fibrillation (AF) has been classified into various types. A newly detected AF on initial presentation is termed as ‘first detected’ episode of AF. However if the episode occurs for 2 or more times, it is classified as ‘recurrent’. After the termination of AF, it is classified as paroxysmal (Self-terminating episodes that last for <7 days) or persistent (lasts for >7 days and often requires electrical or pharmacological cardioversion). AF is termed as ‘permanent’ when it has failed cardioversion or when further attempts to terminate the arrhythmia are deemed futile. Though this classification scheme is generally useful, the pattern of AF may change in response to treatment.¹⁰ Hence with subsequent termination of the episode of AF within 7 days, our case was categorized as paroxysmal atrial fibrillation.

DISCUSSION

In literature, electrical injury has been described to cause various cardiovascular effects including arrhythmias as sinus tachycardia, non-specific ST-T changes, conduction defects in the various forms of heart blocks, bundle branch block, prolongation of QT interval. Ventricular arrhythmias as premature ventricular contractions, ventricular tachycardia, ventricular fibrillation along with supraventricular arrhythmias as atrial fibrillation. Asystole and ventricular fibrillation are the most serious of the cardiac complications of electrical injury. Exposure to high tension current is most likely to cause ventricular asystole. Atrial fibrillation after electrical injury has been reported to be extremely rare. For the few literature available in this respect, most of them were treated by electrical cardioversion. We managed to treat this case by pharmacological cardioversion followed by observation period.

The mechanism of electrical current induced arrhythmia is not clear. Heart muscle biopsy specimens have shown patchy fibrotic necrosis,⁴ which is believed as a potential chronic arrhythmogenic focus. Various disturbances in

the cardiac Na-K channels have also been described.⁵ Cardiac arrhythmias can occur at the time of electrical shock or later, but mostly within first day after injury. Almost all patients with AF have severe electrical burns after high voltage injuries as described in the previous reports and similar was seen in our case too.

A case report from Langford A reported an electrocution induced atrial fibrillation after 11kV electrical shock. The case was treated initially by injection flecainide that failed to revert into sinus rhythm. Thereafter infusion amiodarone was given that showed successful reversal of atrial fibrillation into sinus rhythm.⁷

Our case also represented a similar result though we used amiodarone infusion as an initial therapy. The current NICE guideline (June 2014) also suggests rhythm control with flecainide or amiodarone to be preferred in new onset atrial fibrillation.⁸ Baruchin A M published in case report of successful restoration of sinus rhythm after quinidine.⁹

Purdue et al.⁶ recommended cardiac monitoring during electrical injuries in selective cases only as where there is loss of consciousness, recorded arrhythmia in the field, abnormal ECG on admission and rhythm disturbance during the monitoring. Since our case had AF at presentation, she was kept on cardiac monitoring.

CONCLUSION

There are very few case reports available with a case presenting with AF after high voltage electrical injury. Though considered as benign condition, but a definite guideline to treat this group of patients is missing. So our approach to treat the patient successfully by pharmacological cardioversion followed by observational period can be one way in this aspect.

ACKNOWLEDGEMENTS

My thanks to my parents whose blessings have been always supported me to move forward in life. Also I would like to thank specially to Prafulla K. Singh, Rajesh K. Gautam whose effort had supported me to complete the work in time.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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DOI: 10.5455/2320-6012.ijrms20150434

Cite this article as: Kant P, Singh PS, Zafar KS, Rawat R. Atrial fibrillation associated with high voltage electric shock in a young healthy female: a case report. *Int J Res Med Sci* 2015;3:984-6.